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HAPPI-Farm 10

Minimizing Pollution Risk from

Forest and Streamside Areas Management

Forests and streamside areas can add to the value of your property. They enhance the beauty of your land, serve as windbreaks and wildlife habitats, provide shade, and produce fruits, flowers, or firewood. Well vegetated areas beside streams can act as a filter to keep pollutants from other parts of your operations out of streams. However, improper management of these areas can cause water pollution.

This publication will help you evaluate the water pollution risk from your current forest and streamside (riparian) areas management practices and help you identify areas for improvement. This worksheet is designed for owners and managers of properties with tree farms, forests, or large riparian areas of ½ acre or more. If you have only a small number of trees or limited riparian area on your property, consult HAPPI-Home 12, *Runoff control in your yard and garden*, for more appropriate information.

Managing forest and streamside areas

The best way to reduce the risk of water pollution from your forests and streamside areas is to develop and follow a written management plan. A management plan should start with the goals and objectives of your activities. These could include harvesting timber, recreational uses, preserving habitat for native Hawaiian plants and animals, and many others. Your plan should contain a map and description of the areas. A complete description will include information on size, location, boundaries, soil types, habitat types, major species of interest, and current and proposed uses. You should also include information on specific management requirements such as protecting endangered species. Management planning assistance is available from the Hawaii Department of Land and Natural Resources' Division of Forestry and Wildlife (DOFAW), the Natural Resources Conservation Service (NRCS), and from the CTAHR Cooperative Extension Service (CES). You may also want to consult the DOFAW publication entitled *Best management practices for maintaining water quality in Hawaii*, which provides forest management guidelines and detailed descriptions of good management practices. Even if you do not have a management plan, there are a number of things you can consider to help determine the current water pollution risks from your forests and riparian areas.

Forests

Sediment is the most important water pollutant that comes from forest areas. Properly managed forests have very little soil erosion. Indicators of erosion include muddy water runoff during and after rains, and exposed tree roots. One of the biggest causes of soil erosion in forests is improperly constructed access roads. Poorly constructed roads channel runoff water, which can result in severe gully erosion and cause sediment pollution. Access roads should follow the contour of the land. When roads are constructed up and down slopes, you should establish water diversion devices like water bars or culverts at frequent intervals. Access roads should be seeded with vegetative cover that reduces erosion. Detailed road construction guidelines including recommended spacing for diversion devices can be found in the DOFAW's *Best management practices for maintaining water quality in Hawaii*.

Improper planting and harvesting practices can also cause erosion and sediment pollution To minimize water pollution risk, plant trees through a ground cover of living or dead vegetation. Many soils formerly used for sugarcane cultivation have a hardpan, a layer of compacted soil that water and roots cannot penetrate, about 1 foot under the soil surface. In order for trees to be

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successfully established in these areas, the deep-ripping method of mechanical cultivation may be necessary to break up this hardpan and allow water infiltration and root growth into lower soil layers. Deep ripping also allows up to 10 times as much water to filter into the soil during storms, greatly reducing runoff. If any type of mechanical cultivation is used, be sure to cultivate fields across the slope, and do not cultivate areas near streams or other water bodies.

Improper harvesting activities can cause severe water pollution from soil erosion and also from nutrient deposition into streams and water bodies. Water pollution risks can be greatly reduced through proper harvesting practices including proper construction of access roads, well laid out skid trails, directional felling of crop trees, minimal damage to non-crop trees and understory vegetation, protection of riparian areas, proper disposal of leaves and branches away from water bodies, and prompt revegetation of logged areas. However, before starting any harvesting activities, consult with a professional forester, another forest management professional such as your county service forester, or NRCS or CES field personnel to develop a harvesting plan that minimizes water pollution risk.

Streamside areas

As with forests, the most common type of pollution from streamside areas is sediment. The most common sources of sediment in these areas are areas of bare ground caused by a lack of vegetation and improperly constructed roads and stream crossings. If possible, keep riparian areas well vegetated with a mix of vegetation types including grasses, bushes, and trees. Do not cultivate fields up to the edge of streams and water bodies. DOFAW best management practices recommend leaving a vegetated area, also called a buffer, at least 35 feet wide on each side of a stream or water body. If the area has steep slopes or your soil erodes easily, the buffer area should be wider.

If you have gulches on your property, the recommended best management practice is to plant a buffer of trees and other woody vegetation at the head of the gulch and on flat areas beside the gulch to prevent it from growing. Inside the gulch itself, grasses and groundcover species are recommended to control erosion.

Roads and crossing points are also major sources of sediment from riparian areas. If possible, avoid constructing roads within buffer zones. If roads must be constructed, locate them as far from the stream edge as possible, and try to maintain a curb and thick vegetation between the road and the stream or water body. Construct bridges in situations where streams must be crossed frequently. If bridge construction is not feasible, regularly monitor your stream crossing areas for signs of erosion. Stream crossings should never be bare soil but should be grassed in or hardened with concrete. Information on how properly to construct stream crossings is available from your local Natural Resources Conservation Service office.

Grazing

Some people graze livestock in forests and streamside areas. These areas can provide ample food as well as easy access to water. However, grazing livestock can have both positive and negative effects on forests and riparian areas, depending on the vegetation species, number and type of animals, and management practices. Improperly managed livestock can compact the soil around tree roots and restrict tree growth. They can also destroy new tree growth and reduce potential wildlife habitat by removing the understory vegetation. Livestock

Risk Assessment Table for Forests and Riparian Areas

	Low risk	Moderate risk	High risk	Your risk
Management planning	Have up-to-date management plan for forest and riparian areas	Have management plan but it does not reflect my current situation	No management plan	❑ low ❑ moderate ❑ high
Erosion	Ground under trees covered with vegetation or leaf litter; very little runoff water visible during and after rain	Ground mostly bare under trees, some roots visible; water runoff visible during and after rain	Ground totally bare under trees; many roots visible; muddy water runoff visible during and after rain	❑ low ❑ moderate ❑ high
Roads and stream crossings	Few forest access roads, all roads constructed across slope, no roads in riparian areas, all stream crossings with temporary or permanent bridges	Many forest access roads but all constructed across slope, some roads in riparian areas, stream crossings well maintained and monitored	Forest access roads constructed up and down slope, roads constructed on stream banks, stream crossings not well maintained	❑ low ❑ moderate ❑ high
Grazing	No grazing in forest or riparian areas, or grazing with up-to-date management plan developed with NRCS or CES assistance	Occasional grazing in forest or riparian areas, or grazing with old management plan	Grazing in forest and riparian areas without a grazing management plan	❑ low ❑ moderate ❑ high
Forest establishment (planting)	Trees planted according to management plan developed by forester or other professional, soil disturbance minimized, any mechanical cultivation used only across slope	Limited number of trees planted with minimal soil disturbance	Trees planted with clean cultivation or deep ripping up and down slope	❑ low ❑ moderate ❑ high
Forest harvest	Trees harvested according to harvest plan developed by forester or other professional; riparian areas not harvested	Few trees harvested with minimal disturbance to surrounding vegetation but without harvest plan	Trees harvested without harvest plan and with significant disturbance such as harvesting in riparian areas.	❑ low ❑ moderate ❑ high

that have unrestricted access to streams may cause erosion as they enter and exit the stream, as well as cause nutrient pollution from their urine and feces.

Proper livestock management may improve the health of some forest and riparian areas, particularly areas with low rainfall. It can also provide a valuable source of additional income from these areas. Because of the potential water pollution risks, talk to CES and NRCS personnel to develop an appropriate grazing management plan if you graze or intend to graze livestock in forest or riparian areas. HAPPI-Farm-9, *Pasture management*, provides more infomation.

Assessing your risks

Complete the risk assessment table above to determine your water pollution risks. For each category, choose the set of practices that best fits your situation. Then, go to page 4 and develop an action plan to minimize water pollution on your land.

Your action plan

Now that you have assessed your management practices, you can take action to change practices that may be causing water pollution. For areas that you identified as high or moderate risk, decide what action you need to take and fill out the Action Plan below.

Write down all your moderate-risk and high-risk activities below	What can you do to reduce the potential risk for water pollution?	Set a target date for action
Samples of action items:		
Occasionally graze cattle in forest area without management plan to minimize water pollution risks	*Contact the local CES livestock agent for assistance in developing a grazing management plan*	*By the end of next week (write the specific date)*

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